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## Political Economy of Fiscal Unions

Jan Fidrmuc

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# Political Economy of Fiscal Unions

## Abstract

I formulate a political-economy model of a fiscal union where the threat of secession imposes a limit on fiscal redistribution between regions. I argue that the trade-off between implementing the region's preferred fiscal policy and benefiting from inter-regional risk sharing depends on the nature of economic shocks. Specifically both correlation of shocks across regions and their persistence over time are important. The gains from inter-regional risk sharing are potentially large when shocks are negatively correlated and temporary. In contrast, unions with negatively correlated permanent shocks are likely to prove politically unviable.

JEL-Code: D720, F590, H770.

Keywords: fiscal federalism, risk sharing, disintegration, median voter, optimum currency areas.

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# 1 Introduction

One of the fundamental questions of economics concerns the conditions under which deeper economic integration is possible. For the past five decades, economists thought the answer to this question was embodied in the theory of optimum currency areas (henceforth OCA, see Mundell, 1961, and McKinnon, 1963).<sup>1</sup> This theory states, in essence, that forming a currency union requires either that the participating countries encounter symmetric economic shocks, or that they possess effective adjustment mechanisms for mitigating the adverse effects of such shocks. Symmetry of shocks ensures that the participating countries do not have divergent policy preferences. That would happen, for example, when one country is in a recession but the other is not: these two countries are likely to disagree about in which direction the interest rate or exchange rate should move. Adjustment mechanisms can substitute for the symmetry of shocks: countries with largely asymmetric shocks can maintain a common currency if the adverse effects of asymmetric shocks can be mitigated effectively. A number of mechanisms can serve this purpose: highly mobile labor force or flexible prices and wages, for example.

Another possible adjustment mechanism is fiscal redistribution (Sachs and Sala-i-Martin, 1992, Asdrubali et al., 1996, Person and Tabellini, 1996a,b; Obstfeld and Peri, 1998; Sorensen and Yosha, 1998; Becker and Hoffmann, 2006). Fiscal transfers redistribute income within unions to subsidize the regions hit by negative shocks. This helps reduce the divergence of policy preferences and also smooths the profile of consumption over time. Countries with formal federal structure often operate explicit systems of fiscal transfers between regions to redistribute tax revenue, equalize incomes and/or to counter asymmetric shocks. Even when such explicit fiscal transfers are not present, some redistribution is likely to occur because centralized taxes and automatic stabilizers.

The recent (and on-going) eurozone crisis raised the interest in integration arrangements with fiscal transfers, or the so-called fiscal unions. The potential benefits from forming fiscal unions on top of currency unions have been highlighted by, among others, Beetsma and Jensen (2005), Galí and Monacelli (2008), and Farhi and Werning (2013). These studies emphasize the benefits – higher welfare due to consumption smoothing – that accrue to the participating countries when they enter into a mutual-insurance arrangement. As Farhi and Werning (2013) point out, these benefits are larger when a fiscal union complements a currency union (because countries that give up their currency also lose the ability to counter shocks using monetary policy) and when financial markets are incomplete (because nations and individuals cannot use financial products to fully insure against future shocks). In the face of unknown future shocks, fiscal unions are optimal and naturally complement currency unions. The bigger the shocks and the more persistent, the more attractive it is to form a

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<sup>1</sup>For more recent and more formal discussion, see Alesina and Barro (2002), Alesina, Barro and Tenreyro (2002), and Alesina and Stella (2010).

fiscal union (Farhi and Werning, 2013).

The preceding discussion focuses on the economics of fiscal unions. In this paper, instead, I consider the political constraints that can restrict the implementation of such arrangements. In a nutshell, a mutual-insurance arrangement that is optimal *ex ante* may be rejected by one of the parties *ex post*. The importance of political-economy considerations was underscored recently by the reluctance of Northern euro-zone countries to bail out Greece and other peripheral countries in trouble, or to allow the European Central Bank to do so. Such disagreements about fiscal redistribution have been important also in pro-independence movements in Scotland, Catalonia and Flanders, and have contributed to the break-ups of Czechoslovakia, Yugoslavia and the Soviet Union.

My model is a dynamic version of the static model of Bolton and Roland (1997). It features a union composed of two countries with a centrally-provided public good. As long as integration continues, fiscal policy reflects the union median voter's preferences which, in turn, only depend on the aggregate effect of regional shocks. For example, regional shocks that exactly offset each other would leave the union fiscal policy unchanged (but they would affect the regions' preferred fiscal policies).<sup>2</sup> The two regions thus constitute an implicit fiscal union: fiscal redistribution occurs through centralized fiscal policy rather than by means of explicit inter-regional transfers. The regions, however, have the option to secede and implement their own optimal fiscal policy if the utility gains from doing so outweigh the one-off cost of secession. Because of the shocks, union that was previously stable can break-up following a particular regional shock, whether positive or negative. The opposite is also true; a region that preferred independence initially can come to prefer integration in the wake of a particular shock.

As the aforementioned literature observes, a theory of fiscal unions should complement the OCA theory. In parallel to the latter, my analysis confirms that the nature of shocks is crucial also for fiscal unions. In contrast to the OCA argument, however, two aspects of shocks are important: not only the symmetry (or correlation) of shocks across regions but also their persistence over time. With respect to the correlation, the main insight of the OCA theory is replicated: positively correlated (symmetric) shocks are good for the stability of integration. This is because, in the wake of the shocks, both regions' preferred fiscal policies change in a similar manner: either both prefer more extensive redistribution, or both prefer to scale it down. The situation becomes more complicated when shocks are negatively correlated. In this case, fiscal-policy preferences diverge but the regions can benefit from mutual insurance: under centralized fiscal policy, the region with a positive shock makes a net transfer to the region hit by a negative shock. This is where persistence of shocks proves crucial, however. With temporary shocks, the disutility from having

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<sup>2</sup>The shocks need not be only output shocks (i.e. deviations from the trend growth rate): the analysis is general enough to allow also demographic shocks such as migration flows or natural disasters such as earthquakes.

sub-optimal fiscal policy is short-lived and may be compensated by the benefits of risk sharing. When shocks are permanent, however, fiscal transfers become largely deterministic and unidirectional when one region is hit by a sufficiently large shock (whether positive or negative). Either region can prefer to secede in such a case: the richer region in order to implement a less redistributive fiscal policy or the poorer region because it prefers a greater extent of redistribution than that in place under centralized fiscal policy.

There is by now a rich body of literature analyzing the incentives that countries face to secede: see Alesina and Spolaore (1997 and 2003), Alesina, Spolaore and Wacziarg (2000), Alesina and Perotti (1998), Bolton and Roland (1997), Goyal and Staal (2004), Le Breton and Weber (2003) and Kessler, Lülfesmann and Myers (2009). However, much of this literature (with the exception of Alesina and Perotti, 1998, whose paper I discuss below) is static in nature: it considers the trade-off between heterogeneity of preferences and efficiency gains from integration (or efficiency loss from disintegration), without giving much thought to the factors that might drive preferences further apart or closer together as time passes. My approach, in contrast, offers insights on unions that were originally stable but subsequently broke up as a result of particular economic events or shocks.

Alesina and Perotti (1998) consider fiscal integration between regions that are also subject to idiosyncratic shocks. Their analytical framework, however, differs in several important aspects. First, they consider shocks that are permanent and perfectly negatively correlated across regions. As such, their analysis does not allow inferences on the importance of either correlation or persistence of shocks for the political economy of fiscal integration. Second, they model shocks in a way that ensures that they do not affect income distribution and therefore do not affect preferences over fiscal policy in the case of fiscal autonomy. Therefore, shocks in their model make the tax base stochastic but not the tax rate (again, under fiscal autonomy only, as the shocks cancel out within the union). Third, they assume that income distribution in each region is discontinuous: individuals belong to three discrete income classes. This means that the median voter in the union is always the same, regardless of the shocks. This, together with their assumption on the nature of shocks implies that the tax rate under fiscal centralization becomes stochastic: specifically, it depends only on the shock to the region of the median voter. The tax base, in contrast, is constant under fiscal centralization: this is because the region-specific shocks are perfectly negatively correlated and therefore cancel each other out. Hence, their main conclusion is essentially the same as that of the static political-economy literature discussed above: while fiscal integration offers some benefits in terms of risk sharing (tax base that is constant over time), this comes at the cost of increased heterogeneity in policy preferences (tax rate that changes depending on the shocks' realization).

The paper is structured as follows: The next section introduces the model. Section 3 outlines the regions' incentives for secession and shows how stability of integration is determined by the nature of shocks, while section 4 uses a few historical examples

to discuss my model's predictions. Finally, Section 5 concludes.

## 2 The Model

I consider a union composed of two regions denoted by  $k = a, b$ . For simplicity, the regions are assumed to be of equal size. The aggregate output of region  $k$  at time  $t$  consists of a deterministic and a stochastic term:

$$Y_{k,t} = \bar{Y}_k + E_{k,t} \quad (1)$$

where  $\bar{Y}_k$  is the deterministic term and represents the region's potential output which I assume to be constant over time (adding a constant trend growth rate would represent a trivial modification which I do not pursue for the sake of simplicity).  $E_{k,t}$  is the stochastic component of region  $k$ 's output in period  $t$ ; this term can be either positive or negative. The stochastic component is intended to capture any factors that are idiosyncratic to the region and cause its output to fluctuate over time. As such, it can include business cycle fluctuations due to demand or supply shocks, weather and climate, natural disasters or factor mobility (most notably, migration of workers). I assume that the region-specific shocks are independent of each other but, as I discuss in more detail below, each shock can have spillover effect on the other region. Finally, the output of the union is given as the sum of the regional outputs.

The region's output can be expressed in per-capita terms:

$$y_{k,t} = \bar{y}_k + \varepsilon_{k,t} \quad (2)$$

where  $\bar{y}_k$  is the average income in the absence of any shocks and  $\varepsilon_k$  is the per-capita income shock. I assume that the region-specific shock follows an AR(1) process

$$\varepsilon_{k,t} = \rho_k \varepsilon_{k,t-1} + \eta_{k,t} \quad (3)$$

where  $\eta_{k,t}$  is white noise with a zero mean and variance  $\sigma_k^2$ , and the persistence parameter  $\rho_k$  is such that  $0 \leq \rho_k \leq 1$ . The union's average output is then

$$y_t = \frac{\bar{y}_a + \bar{y}_b}{2} + \frac{\varepsilon_{a,t} + \varepsilon_{b,t}}{2} = \bar{y} + \varepsilon_t \quad (4)$$

where, for notational purposes, parameters lacking a subscript are those pertaining to the union as a whole.

Each individual receives also a deterministic income stream every period: for individual  $i$  in region  $k$ , this is denoted as  $\bar{v}_{ik}$ . Individual incomes are assumed to take values between  $v$  and  $V$ , where  $0 < v < V$ . I make a few specific assumptions about the distribution of individual incomes. First, I assume that it is skewed so that the median income,  $\bar{v}_{mk}$ , is always smaller than or equal to the average income,  $\bar{v}_{mk} \leq \bar{y}_k$  and  $\bar{v}_m \leq \bar{y}$ , where subscripts  $mk$  and  $m$  denote the median individuals

in region  $k$  and in the union, respectively. Second, I assume that the distribution function, while skewed, is continuous.<sup>3</sup> Third, I assume that all individuals living in region  $k$  encounter the same shock,  $\varepsilon_{k,t}$  so that individual  $i$ 's actual income is  $v_{ik,t} = \bar{v}_{ik} + \varepsilon_{k,t}$ . While this assumption may be too restrictive, the results of my model would hold also when assuming that the individual shocks encountered by individuals in the same region are positively correlated or even less restrictively, that only the average and median incomes are subject to similar shocks.

Furthermore, I assume that the union median income,  $v_{m,t}$ , is subject to the average shock,  $\varepsilon_t$ , and that it always lies strictly between the median incomes of the two regions. This, of course, does not mean that the union median voter herself is exposed to the average shock. Rather, the identity of the union median voter changes after every set of shocks. Because income distributions are continuous, the new median voter's position in the union-wide income distribution is such as if her income were subject to the average shock.<sup>4</sup> This assumption implies a crucial difference between my model and that of Alesina and Perotti (1998). They assume that the union median voters always belongs to the same country (specifically, they assume that one country is marginally larger) and therefore the union's tax rate responds only to the shock in that country.<sup>5</sup> In contrast, in my model, union's fiscal policy depends on the average economic conditions in the union. In other words, as long as the median income in the union changes, the identity of the median voter changes as well – but it is the level of median income and not the nationality of the median-income individual, that matters for fiscal redistribution.

Individuals derive utility from consumption of private and public goods with an increasing and concave utility function:  $u'(\cdot) > 0$  and  $u''(\cdot) < 0$ . I assume that there is no lending or borrowing either by individuals or by the government. This assumption means that neither the individual nor the government can smooth the profile of consumption over time by accumulating or running down savings so that any consumption smoothing that result in the model is the result of inter-regional risk-sharing. The government has two instruments of fiscal policy at its disposal: a linear tax and a public good. Taxation is distortionary: levying a tax of  $t$  is associated with a cost equivalent to  $\frac{t^2}{2}$ . Since there is no saving or borrowing by the government, the budget is balanced every period. The public good is thus financed by the total amount of tax revenue collected less the dead-weight cost of taxation:

$$g_t = (t_t - \frac{t_t^2}{2})y_t. \quad (5)$$

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<sup>3</sup>Hence, I specifically rule out discontinuous distributions such as the one assumed by Alesina and Perotti (1995).

<sup>4</sup>To be precise, the exact position of the union median would depend on the difference in skeweness of income distributions in the two regions. The assumption that the median voter is affected by the average of the two regional shocks is therefore a slight simplification consistent with the case where the two income distributions are similarly skewed.

<sup>5</sup>See equation (6) in their paper, noting that the regional shocks are assumed to be perfectly negatively correlated so that they cancel out in the denominator.

While individual income endowments differ, and therefore so do disposable incomes, each individual receives the same amount of the public good. Private and public goods are assumed to be perfectly substitutable so that the utility function is linear in consumption. The consumption of individual  $i$  then is:

$$c_{ik,t} = (1 - t_t)v_{ik,t} + (t_t - \frac{t_t^2}{2})y_t. \quad (6)$$

The tax rate is determined by a union-wide vote. I assume voting takes place each period after the regional shocks become known. Since voters' preferences are single-peaked and the individuals cannot save to smooth consumption intertemporally, the optimal tax rate will be the rate maximizing the median voter's consumption in the given period:

$$t_t^*(y_t, v_{m,t}) = \frac{y_t - v_{m,t}}{y_t} \quad (7)$$

The tax rate thus depends on the skewness of income distribution: the greater the difference between the average and median incomes, the higher the tax rate.

The regions' preferences over fiscal policy may differ from that chosen by the union median voter. In particular, each region's optimal tax rate is the rate that maximizes consumption of that region's median-income voter:

$$t_{k,t}^*(y_{k,t}, v_{mk,t}) = \frac{y_{k,t} - v_{mk,t}}{y_{k,t}}. \quad (8)$$

Fiscal policy responds to region-specific shocks. In particular, the tax rate is counter-cyclical:

$$\frac{\partial t_t^*}{\partial \varepsilon_{k,t}} = -\frac{1}{2} \frac{y_t - v_{m,t}}{y_t^2} < 0$$

so that the tax rate rises during a recession and falls during a boom. This is because the shock alters the skewness of income distribution, as captured by the ratio  $\frac{v_{m,t}}{y_t}$ . On the other hand, the public good is pro-cyclical:

$$\frac{\partial g_t}{\partial \varepsilon_{k,t}} = \frac{1}{4} t_t^2 > 0.$$

The fact that fiscal policy responds to shocks stems from the preceding assumptions that the shocks are additive and the same shocks affects both the median and average incomes. This treatment of shocks implies that the poor are in effect more vulnerable to the shocks than the rich: since the shock is the same for everyone, it constitutes a greater share of the deterministic income component of poor individuals. This can be rationalized by pointing out that the ability to diversify risks tends to increase with income: the poor typically derive most or all of their earnings from labor while investment income can be an important component of earnings for the rich. Importantly, these assumptions also imply that the shocks alter the skewness of income distribution and, in turn, the median voter's preferred fiscal policy.

The alternative assumption of multiplicative shocks, in contrast, would result in the shocks having no effect on fiscal policy: additive shocks affect income distribution  $\frac{v_{m,t}}{y_t} = \frac{\bar{v}_{m,t} + \varepsilon_t}{\bar{y} + \varepsilon_t}$ , whereas multiplicative shocks cancel out,  $\frac{v_{m,t}}{y_t} = \frac{\bar{v}_{m,t}(1+\varepsilon_t)}{\bar{y}(1+\varepsilon_t)}$ .<sup>6</sup>

The region's preferred tax rate thus depends on that region's income distribution and the realization of the region-specific shock. Unless the income distributions and shocks are identical in both regions, their preferred tax rates will be different from each other and both will, in turn, differ from the union tax rate. Therefore, without efficiency gains, economies of scale or other benefits of integration, the two regions would always prefer independence and fiscal autonomy to fiscal integration.

## 3 Shocking Aspects of Fiscal Integration

### 3.1 Integration vs Secession

The tax rate in equation (7) maximizes the consumption of the union's median voter. The tax rates preferred by the two regional median voters are generally different from the union tax rate as well as from each other: they would be the same only if the two regions had the same income distributions *and* faced exactly the same shocks. Integration thus carries the cost of compromising over fiscal policy. On the other hand, integration carries two important benefits. First, it brings about efficiency gains and economies of scale because of free trade, unrestricted flow of factors of production and access to a larger market. Second, and this is particularly important in the context of my analysis, integration implies risk sharing. Note that risk sharing and inter-regional redistribution are not explicit: the regions do not vote on or bargain about transfers. Instead, risk sharing occurs automatically because tax collection and fiscal transfers are determined at the union-wide level: they reflect the union-wide income distribution and the average of the two regional shocks. Moreover, risk sharing is only a side effect of fiscal policy: its main objective is redistribution from rich to poor. The rich region may be making a net transfer to the poor one even if the former is hit by a negative shock, as long as it remains richer than the poor region – but the size of the net transfer is sensitive to the shock.

Each period, either region can decide whether they remain in the union or secede. This decision takes place before the region-specific shocks are realized. Therefore, the decision is based on the expectations of current period's shocks, which in turn depend on the past realizations of shocks and their persistence. I assume that the persistence of past shocks is common knowledge. The decision on fiscal policy, on the other hand, is made after the shocks have been revealed and therefore taxes and transfers reflect

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<sup>6</sup>The latter is the reason why in Alesina and Perotti's (1998) model fiscal policy is independent of shocks in case of independence. With integration, in contrast, their assumption that the median voter stems from the (slightly) larger region means that fiscal policy responds only to the larger region's shock.

the actual realization of shocks in the current period. The union breaks up whenever at least one region votes for secession.

Secession comes at a cost  $\lambda_{k,t} \leq 0$ . This reflects the loss of efficiency gains from integration as well as the initial cost of creating a new regional government, military, etc. Note that the cost need not be symmetric: one of the regions can find secession less costly, for example because of considerations such as national pride, patriotism or historical legacies. The decision to secede therefore depends on whether the region's median voter is better off under integration or under secession, taking into account the difference between the region's preferred fiscal policy and the union fiscal policy (which in turn depend on the realizations of region-specific shocks) and the efficiency loss due to secession. We can formalize this as follows (to simplify the notation, I use subscript  $k$  when referring to the region's own variables while  $-k$  denotes variables pertaining to the other region):

**Definition 1** *Region  $k$  has an incentive to secede if the median voter expects greater consumption under secession than under integration, i.e. secession brings about a positive expected gain from secession*

$$\Delta_{k,t} \equiv E_t [c_{mk,t}(\varepsilon_{k,t}, \lambda_{k,t}) - c_{mk,t}^u(\varepsilon_{k,t}, \varepsilon_{-k,t})] > 0 \quad (9)$$

Here,  $c_{mk,t}^u(\varepsilon_{k,t}, \varepsilon_{-k,t})$  is the consumption of region  $k$ 's median voter in case of continued integration. Given that the shocks are autocorrelated, (9) can be rewritten as follows:

$$\Delta_{k,t} \equiv c_{mk,t}(\rho_k \varepsilon_{k,t-1}, \lambda_{k,t}) - c_{mk,t}^u(\rho_k \varepsilon_{k,t-1}, \rho_{-k} \varepsilon_{-k,t-1}) > 0 \quad (10)$$

The outcome of the vote on secession therefore depends on the realization of previous period's shocks and their persistence.

As a digression, equation (9) is a necessary but not sufficient condition for secession. Whether secession occurs depends on the net present value of the gain from secession,  $NPVS_{k,t} \equiv \sum_{s=0}^{\infty} \delta^s E_t \Delta_{k,t+s}$  (assuming secession is irreversible). The sufficient condition for secession then is  $NPVS_{a,t} + NPVS_{b,t} > 0$ , reflecting the fact that as long as at least one region prefers integration, it can offer concession to the other region to prevent it from seceding.<sup>7</sup> This, however, would introduce the possibility of strategic behavior, especially if  $\lambda_{k,t}$  is not observable: either region could threaten to leave the union in order to elicit concessions from the other region. The Irish referenda on Nice and Lisbon Treaties can be seen as examples of such behavior: both were initially rejected, only to be approved later after Ireland received important concessions. Another example is the decision of the Greek government to call for an election in May 2012 and leaving it up to the ensuing government to approve the bail-out agreement with the European Commission, ECB and IMF: that election

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<sup>7</sup>Bolton and Roland (1997) discuss bargaining over tax rate as union-preserving measure. Another possibility is to incorporate inter-regional transfers (Dixit and Londregan, 1998).

almost resulted in a Greek exit from the eurozone but eventually helped the Greeks to earn some concessions. While interesting, such considerations are largely orthogonal to the question of the effect of shocks on integration. Therefore, I do not include them in this paper.

To evaluate the expected gain from secession, note that under integration the consumption of individual  $i$  in region  $a$  is:

$$c_{ik,t}^u(\varepsilon_{k,t}, \varepsilon_{-k,t}) = v_{ik,t} + \frac{1}{2} \frac{y_t - v_{m,t}}{y_t} [(y_t - v_{ik,t}) + (v_{m,t} - v_{ik,t})] \quad (11)$$

Correspondingly, the consumption of region  $k$ 's median voter under integration is:

$$c_{mk,t}^u(\varepsilon_{k,t}, \varepsilon_{-k,t}) = v_{mk,t} + \frac{1}{2} \frac{y_t - v_{m,t}}{y_t} [(y_t - v_{mk,t}) + (v_{m,t} - v_{mk,t})]. \quad (12)$$

Finally, the consumption of region  $k$ 's median voter under secession is the following (note that it incorporates the cost of secession,  $\lambda_{k,t}$ ):

$$c_{mk,t}(\varepsilon_{k,t}, \lambda_{k,t}) = v_{mk,t} + \frac{1}{2} \frac{(y_{k,t} - v_{mk,t})^2}{y_{k,t}} + \lambda_{k,t} \quad (13)$$

After substituting from equations (13) and (12), the expected gain from secession,  $\Delta_{k,t}$  can be rewritten in the following manner:<sup>8</sup>

$$\Delta_{k,t} = E_t \left[ \frac{1}{2} \frac{(v_{m,t} - v_{mk,t})^2}{y_t} + \frac{1}{2} (y_{k,t} - y_t) \left( 1 - \frac{v_{mk,t}^2}{y_k y_t} \right) \right] + \lambda_{k,t} \quad (14)$$

The first term in equation (14) reflects the differences in income distributions between the union as a whole and region  $k$ . The greater the difference, the greater the incentive for the region to leave. Note that the incentive to secede increases with the absolute distance: the poor region also gains from secession because it can implement its preferred fiscal policy in that case. The second term captures the difference in tax base (combined again with the income-distribution effect). The higher region  $k$ 's mean income compared to the union's mean income, the greater the incentive to secede. Finally, the last term captures the cost of secession.

To see how the political mechanism works, consider first the following simple case. Suppose there are no region specific shocks, and the cost of secession is zero,  $\lambda_{k,t} = 0$ . Then, integration is never sustainable unless  $v_{mk} = v_m$  and  $y_k = y$  for both regions. In equation (14), the first term is positive for any  $v_{mk} \neq v_m$ , whereas the second term is positive for the richer region with  $y_{k,t} > y_t$ . Therefore, in this case, the rich region will always want to secede; the poor region may or may not prefer to secede too depending on whether the income-inequality effect or the tax-base effect dominates.

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<sup>8</sup>Note that the variables pertaining to the union,  $v_{m,t}$  and  $y_t$ , depend on both shocks,  $(\varepsilon_{k,t}, \varepsilon_{-k,t})$ , whereas  $v_{mk,t}$  and  $y_{k,t}$  only depend on  $\varepsilon_{k,t}$ .

### 3.2 Effects of Shocks

Next, I turn to the role played by the region-specific shocks. Voters in one or both regions may be induced to vote for secession either in response to the home-region's shock or because of the other region's shock: either shock can raise or reduce the incentive for secession captured by the expected gain from secession,  $\Delta_{k,t}$ .

To make the analysis tractable, two rather trivial assumptions are necessary:

**A1** Region  $a$  is always richer than region  $b$ ; this holds both for the median incomes as well as (weakly) for the average incomes:  $v_{ma,t} > v_{m,t} > v_{mb,t}$  and  $y_{a,t} \geq y_t \geq y_{b,t}$ . This is not to say that shocks cannot be large enough to reverse the relative ordering of the two regions. Rather, it merely states that which ever region happens to be richer is labeled as region  $a$ . Note that this assumption implies that region  $a$ 's median voter would prefer strictly lower extent of redistribution than the union median voter if she were pivotal, whereas the opposite is true for region  $b$ 's median voter:  $\frac{v_{ma,t}}{y} > \frac{v_{m,t}}{y} > \frac{v_{mb,t}}{y}$ .

**A2** The median income in either region does not exceed the union's average income:  $v_{mk,t} < y_t$  (i.e. neither median voter would prefer  $t_t^* = 0$  if pivotal in the union).

Because the vote on secession takes place before the shocks are realized, the decision is based on the expectations of the current-period shocks which in turn depend on the realizations of previous-period shocks and their persistence,  $E_t \varepsilon_{k,t} = \rho_k \varepsilon_{k,t-1}$  and  $E_t \varepsilon_{-k,t} = \rho_{-k} \varepsilon_{-k,t-1}$ . I consider the impact of the other region's shock first:

**Proposition 1** (a) *Assuming that the persistence parameter is not zero,  $\rho_{-k} > 0$ , positive shock in the other region at time  $t-1$  reduces the home region's incentive to secede at time  $t$ , a negative shock increases the incentive to secede.*

$$\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{-k,t-1}} < 0$$

(b) *The effect is greater (in absolute value) for region  $a$  than for region  $b$  (ceteris paribus).*

**Proof.** (a) Differentiating  $\Delta_{k,t}$  with respect to  $\varepsilon_{-k,t-1}$  while holding  $\varepsilon_{k,t-1}$  constant yields:

$$\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{-k,t-1}} = \left[ \frac{1}{2} \frac{v_{m,t} - v_{mk,t}}{y_t} - \frac{1}{4} \frac{(v_{m,t} - v_{mk,t})^2}{y_t^2} - \frac{1}{4} \frac{y_t^2 - v_{mk,t}^2}{y_t^2} \right] \rho_{-k} \quad (15)$$

The RHS of equation (15) can be reduced to  $4y_t^2(y_t - v_{m,t} + 2v_{mk,t})(v_{m,t} - y_t)\rho_{-k}$ . The second term in parentheses is negative for both regions by assumption A2. Given that I assume that the inter-temporal correlation term is positive, the expression is negative for both regions. (b) Assumption A1 implies  $v_{ma,t} > v_{mb,t}$ , so that the absolute value of this expression is higher for region  $a$  than for region  $b$ . ■

The upshot of Proposition 1 is that for a given realization of the region's own shock,  $\varepsilon_{k,t-1}$ , either region is more likely to secede if the other region encountered a negative shock in the preceding period,  $\varepsilon_{-k,t-1} < 0$ . The intuition underlying this result is simple. For a given own shock,  $\varepsilon_{k,t-1}$ , a positive shock in the other region reduces the expected union tax rate (*tax-rate effect*) and raises the expected level of government spending (*transfer effect*). The transfer effect increases the consumption in both regions. The tax effect is different, though. The median voter in region  $a$  prefers a lower tax rate than the union tax rate by assumption A1. A positive shock in region  $b$  decreases the expected union tax rate, so that the expected disparity between region  $a$ 's preferred tax rate and the union tax rate shrinks. The transfer effect also implies that the incentive for region  $a$  to secede falls after a positive shock in region  $b$ . On the other hand, region  $b$ 's preferred tax rate is higher than the tax rate chosen by the union median voter. Thus, as the expected union tax rate falls, the expected disparity between the two tax rates widens even further. Hence, the tax effect and the transfer effect go in opposite directions for region  $b$ . The response of region  $b$  will therefore be smaller than the response of region  $a$ , even though the overall effect is unambiguously positive for both regions.

Analyzing how the decision on secession is affected by the region's own shock is less straightforward. Differentiating  $\Delta_{k,t}$  with respect to  $\varepsilon_{k,t-1}$  while holding  $\varepsilon_{-k,t-1}$  constant yields:

$$\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{k,t-1}} = \left[ -\frac{1}{2} \frac{v_{m,t} - v_{mk,t}}{y_t} - \frac{1}{4} \frac{(v_{m,t} - v_{mk,t})^2}{y_t^2} + \frac{v_{mk,t}}{y_{k,t}} - \frac{v_{mk,t}}{y_t} - \frac{1}{2} \frac{v_{mk,t}^2}{y_{k,t}^2} + \frac{1}{4} + \frac{1}{4} \frac{v_{mk,t}^2}{y_t^2} \right] \rho_k \quad (16)$$

The sign of this expression is analytically ambiguous. Therefore, I consider first a simplified case:

**Proposition 2** *If mean incomes before shocks are the same in both regions, i.e.  $y_{a,t} = y_{b,t} = y_t$ , and assuming that the persistence parameter is positive,  $\rho_k > 0$ , then:*

(a) *A positive shock in region  $a$  will increase this region's incentive to secede. A negative shock in region  $a$  will reduce this region's incentive to split off:*

$$\frac{\partial \Delta_{a,t}}{\partial \varepsilon_{a,t-1}} > 0$$

(b) *The response of region  $b$  depends on the difference between the median income in  $b$  and the union's median:  $\frac{\partial \Delta_{b,t}}{\partial \varepsilon_{b,t-1}}$  is positive for small  $(v_{mb,t} - v_{m,t})$  and negative otherwise.*

**Proof.** For  $y_{a,t} = y_{b,t} = y_t$ , equation (16) can be rewritten as follows:

$$\begin{aligned} \frac{\partial \Delta_{k,t}}{\partial \varepsilon_{k,t-1}} &= \left[ -\frac{1}{2} \frac{v_{m,t} - v_{mk,t}}{y_t} - \frac{1}{4} \frac{(v_{m,t} - v_{mk,t})^2}{y_t^2} + \frac{1}{4} \frac{y_t^2 - v_{mk,t}^2}{y_t^2} \right] \rho_k \\ &= \left[ \frac{1}{4} (y_t^2 - v_{m,t}^2) + \frac{1}{2} (v_{mk,t} - v_{m,t}) (y_t - v_{mk,t}) \right] y_t^2 \rho_k \end{aligned}$$

The first term of the expression in the second line above is always positive. The second term is positive for region  $a$  and negative for region  $b$ ; this follows from assumptions A1 and A2. Hence,  $\frac{\partial \Delta_{a,t}}{\partial \varepsilon_{a,t-1}}$  is positive, whereas  $\frac{\partial \Delta_{b,t}}{\partial \varepsilon_{b,t-1}}$  can be either positive or negative. When  $(v_{mb,t} - v_{m,t})$  is small in absolute value, the first term outweighs the second term, and the opposite is true for large  $(v_{mb,t} - v_{m,t})$ . ■

**Corollary 3** *If the average incomes in the two regions are different,  $y_{a,t} \neq y_{b,t}$ , then the effect of the region's own shock on its incentive to secede is analytically ambiguous for both regions. Numerical simulations<sup>9</sup> with  $y_{a,t} > y_{b,t}$ , nevertheless, yield result identical to Proposition 2, i.e.  $\frac{\partial \Delta_{a,t}}{\partial \varepsilon_{a,t-1}}$  is always positive whereas  $\frac{\partial \Delta_{b,t}}{\partial \varepsilon_{b,t-1}}$  is positive for small  $(v_{m,t} - v_{mb,t})$  and negative otherwise.*

The result described in Proposition 2 and Corollary 3 again reflects the tax effect and the transfer effect. A positive shock in either region reduces the expected union tax rate and raises the expected transfer. In case of region  $A$ , the median voter's preferred tax rate is lower than the union's tax rate. After the shock, the expectations of both the union's tax rate and the region's tax rate fall. However, the region's own preferred tax rate falls by more, thus further increasing the difference between the two tax rates.<sup>10</sup> The transfer, on the other hand, rises in the wake of a positive shock. However, region  $a$ 's tax base  $y_{a,t}$  rises by more than the union's tax base  $y_t$ . This implies that region  $a$  would enjoy a greater increase in the level of the transfer in case of secession. Both these effects make secession more attractive for region  $a$ .

On the other hand, in case of region  $b$ , the median voter's preferred tax rate is above the union's tax rate. A positive shock results in the reduction of both the expected union's tax rate as well as the region  $b$ 's expected tax rate. The expectation of the region's preferred tax rate falls by more and the difference in this case thus shrinks. The transfer effect on region  $b$  is similar the effect on region  $a$  described above. Hence, for region  $b$  the tax and transfer effects go in opposite directions. Depending on how different the two regional income distributions are from each other, the overall effect therefore can be positive or negative.

### 3.3 Persistence and Correlation of Shocks

As discussed above, region specific shocks can alter the incentives for secession, and thus induce the union to break up. Stability of integration – and in turn the likelihood of disintegration – depends on the nature of shocks. So far, I considered only the response of each region to their own shock and to the shock affecting their union

<sup>9</sup>I performed numerical simulations using  $y = 10$  and  $v_m = 7.5$ . Regional shocks were given values between  $-3$  and  $3$ . The values for  $y_a$ ,  $y_b$ ,  $v_{ma}$  and  $v_{mb}$  varied around their respective means.

<sup>10</sup>Recall that the regions preferred tax rate fully responds to the home-region shock  $\varepsilon_{k,t}$ , whereas the union's tax rate responds to the average shock,  $\varepsilon_t \equiv \frac{\varepsilon_{a,t} + \varepsilon_{b,t}}{2}$ . Unless  $\varepsilon_{a,t} = \varepsilon_{b,t}$ , the region's tax rate fall by more than the union's tax rate in response to a positive home shock.

partner. Now I turn to the specific properties of the shocks: their persistence over time and their correlation across regions.

**Proposition 4** Persistence: *Assume the union is a-priori stable, i.e. neither region would vote for secession in the absence of shocks:*

$$\Delta_{k,t}(\rho_k \varepsilon_{k,t-1}, \rho_{-k} \varepsilon_{-k,t-1})|_{\varepsilon_{k,t-1}=\varepsilon_{-k,t-1}=0} \leq 0$$

*Then, assuming the other region's shock is white noise,  $\rho_{-k,t-1} = 0$ , for a positive value of own shock,  $\varepsilon_{k,t-1} > 0$ , there is a value of the persistence parameter  $\bar{\rho}_k$  such that  $\Delta_{k,t}(\rho_k \varepsilon_{k,t-1}, 0) \leq 0$  for every  $\rho_k \leq \bar{\rho}_k$ . Similarly, assuming the home region's shock is white noise,  $\rho_{k,t-1} = 0$ , for a negative other region's shock,  $\varepsilon_{-k,t-1} < 0$ , there is a value of the persistence parameter  $\bar{\rho}_{-k}$  such that  $\Delta_{k,t}(0, \rho_{-k} \varepsilon_{-k,t-1}) \leq 0$  for every  $\rho_{-k} \leq \bar{\rho}_{-k}$ . If  $\bar{\rho}_k$  and  $\bar{\rho}_{-k}$  are less than one, then secession takes place if  $\rho_k > \bar{\rho}_k$  and  $\rho_{-k} > \bar{\rho}_{-k}$ , respectively.*

**Proof.** The expected gain from secession rises for  $\varepsilon_{k,t-1} > 0$  and/or  $\varepsilon_{-k,t-1} < 0$  (and falls for  $\varepsilon_{k,t-1} < 0$  and/or  $\varepsilon_{-k,t-1} > 0$ ). As follows from equations (15) and (16),  $\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{k,t-1}}$  and  $\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{-k,t-1}}$  equal zero for  $\rho_k = 0$  and  $\rho_{-k} = 0$ , respectively. Hence, if both shocks are white noise, they do not affect the expected gain from secession and hence they do not undermine the stability of integration. If either shock is persistent,  $\rho_k > 0$  or  $\rho_{-k} > 0$ , then the following holds

$$\begin{aligned} \Delta_{k,t}(\rho_k \varepsilon_{k,t-1}, 0)|_{\rho_{k,t-1} > 0, \varepsilon_{k,t-1} > 0} &> \Delta_{k,t}|_{\rho_{k,t-1} = \rho_{-k,t-1} = 0} \\ \Delta_{k,t}(0, \rho_{-k} \varepsilon_{-k,t-1})|_{\rho_{-k,t-1} < 0, \varepsilon_{-k,t-1} < 0} &> \Delta_{k,t}|_{\rho_{k,t-1} = \rho_{-k,t-1} = 0} \end{aligned}$$

By continuity,  $\Delta_{k,t}(\rho_k \varepsilon_{k,t-1}, 0) \leq 0$  ( $\Delta_{k,t}(0, \rho_{-k} \varepsilon_{-k,t-1}) \leq 0$ ) holds for at least part of the interval  $0 < \rho_k \leq 1$  ( $0 < \rho_{-k} \leq 1$ ). ■

The upshot of Proposition 4 is that if shocks are sufficiently short-lived, they will not give a sufficient incentive for either region to secede: the gain from seceding would be so small so as to be outweighed by the efficiency loss due to disintegration. Permanent or highly persistent shocks, on the other hand, can bring the union down.

So far, I have been assuming that the regional shocks are fully independent of one another, i.e. each shock only affects incomes in one region. In open economies, this is unlikely to be the case: shocks have spillover effects because of trade, migration and investment flows, due to remittances from migrants or because of dividend payments on past investments. Therefore, I now consider the case when shocks have spillover effects.

**Proposition 5** Correlation: *Positive correlation (spillover) of shocks reduces the probability of secession, whereas negative correlation increases that probability, taking the persistence of shocks as given.*

**Proof.** Assume shocks' effects are correlated in that there is a spillover between the regions so that individual incomes in region  $k$  also depend on the shock experienced by the other region,  $\frac{\partial v_{ikt}}{\partial \varepsilon_{-kt}} = \gamma$ . Then, for a given home-region shock, the shock in the other region affects the median voter's expected gain from secession in the following manner:

$$\begin{aligned} \frac{\partial \Delta_{k,t}}{\partial \varepsilon_{-k,t-1}} = & \left[ \frac{1}{2} \frac{v_{m,t} - v_{mk,t}}{y_t} - \frac{1}{4} \frac{(v_{m,t} - v_{mk,t})^2}{y_t^2} - \frac{1}{4} \frac{y_t^2 - v_{mk,t}^2}{y_t^2} \right] \rho_{-k} + \\ & \left[ -\frac{1}{2} \frac{v_{m,t} - v_{mk,t}}{y_t} - \frac{1}{4} \frac{(v_{m,t} - v_{mk,t})^2}{y_t^2} + \frac{v_{mk,t}}{y_{k,t}} - \frac{v_{mk,t}}{y_t} - \frac{1}{2} \frac{v_{mk,t}^2}{y_{k,t}^2} + \frac{1}{4} + \frac{1}{4} \frac{v_{mk,t}^2}{y_t^2} \right] \gamma \rho_k \end{aligned}$$

The first term corresponds to the expression for  $\frac{\partial \Delta_{k,t}}{\partial \varepsilon_{-k,t-1}}$  when shocks are independent, as in equation (15), whereas the second term captures the spill-over effect of the other region's shock (cf. equation 16). As shown by Proposition 1, the term in the first brackets is negative, while by Proposition 2 and Remark 3 the term in the second brackets is positive (assuming  $v_{mb,t} - v_{m,t}$  is sufficiently small). Hence, if the spillover effects of shocks are positive,  $\gamma > 0$ , so that the shocks become ex-post positively correlated, the second term mitigates the effect of the first term. On the other hand, if shocks are negatively correlated, both effects go in the same direction, thus increasing the probability of secession. ■

The last two propositions complement and qualify the key insight of the OCA literature. That literature only considers the correlation (symmetry) of shocks. The present paper adds another dimension: the persistence of shocks. In particular, unions can be stable despite negatively correlated shocks, as long as these shocks are sufficiently transient.

### 3.4 Implications

Few additional observations can be made based on the present model's predictions:

**Remark 1** Risk sharing: *Integration reduces the uncertainty about fiscal policy. Both the tax rate and the tax base are more volatile after secession than under integration. Integration thus helps smooth taxes and in turn reduces the volatility of disposable income and consumption. The potential benefits from risk sharing are at their greatest when shocks are negatively correlated.*

This result is easy to see: the union tax rate and transfer are affected by the average shock,  $\varepsilon_t$ . After secession, regional fiscal instruments respond to the regional shocks and are therefore more volatile. Centralized fiscal policy stabilizes both the tax rate as well as the tax base in this model. This contrasts with Alesina and Perotti (1998): in their model, fiscal integration stabilizes the tax base but increases

the volatility of the tax rate. Because agents are risk averse, the potential benefits from risk sharing are at their greatest when the shocks are negatively correlated: in this case the volatility of union's fiscal instruments is minimized. Note however, that when the shocks are persistent, the benefits from risk sharing have to be weighted against the effects of shocks upon diverging preferences regarding fiscal policy in the two regions. Therefore, the potential for risk sharing is greatest when shocks are negatively correlated and transient.

**Remark 2** *Uncertainty: An increase in the variance of either shock,  $\sigma_k^2$  increases the probability of disintegration, but only if the shocks are persistent.*

High variance in case of persistent shocks implies greater likelihood that a sufficiently large shock will occur to prompt one of the region to split off. On the other hand, if shocks become more volatile but are generally transitory in nature, the potential benefits from risk sharing increase.

An increase in the variance of region specific shocks was probably one of the factors behind disintegration of several countries in Central and Eastern Europe. Abandoning the planned economy implied a substantial increase in the volatility of economic activity. In addition, the radical economic reforms implemented at the same time may have resulted in changes in the correlation and persistence of shocks, and integration arrangements became unsustainable.<sup>11</sup>

**Remark 3** *Decentralization may destabilize integration arrangements if it decreases the spillover of shocks across regions.*

Decentralization implies that regions are increasingly subject to different policies. For example, promoting the use of regional minority languages – such as French in Quebec, Catalan in Catalonia or Flemish in Flanders – restricts labor mobility across language boundaries. Similarly, regional policies promoting different industries can make regions more vulnerable to asymmetric shocks. All these measures in turn reduce the spillovers of shocks across regions. This should make such unions more fragile politically. Hence, the efforts to rescue troubled unions by increasing regional autonomy may prove futile, and federalization, or devolution, may indeed be merely a step toward the slippery slope of disintegration. This observation is in line with the argument that OCA criteria are endogenous in the degree of economic integration: countries joining a monetary union are more likely to form an OCA ex post than ex ante (Frankel and Rose, 1998). The endogeneity argument thus holds more generally, not only for monetary integration but also for fiscal unions. Moreover, increasing fiscal autonomy of regions directly reduces the potential for risk sharing – thus reducing the benefits of integration even further.

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<sup>11</sup>See Fidrmuc, Horvath and Fidrmuc (1998) for an empirical analysis of the break-up of Czechoslovakia.

**Remark 4** *Size: Relaxing the assumption of regions being equally sized, and assuming (for simplicity) that the cost of secession is independent of size, the smaller region stands to gain more by seceding than the larger region.*

In a union composed of unequally sized regions, given that the union's fiscal policy responds to the average shock, the larger region's shock affects the centralized fiscal policy more than the smaller region's shock. This implies that the smaller region is more likely to find itself preferring secession following a particular realization of either its own shock or the other region's shock. If the per-taxpayer cost of secession is higher for the smaller regions (because of their greater dependence on trade and other economic linkages with the other region as well as because both regions face a more-or-less fixed cost of establishing new government institutions, embassies abroad and the like) then this should moderate the above-mentioned effect of size.

## 4 Historical Examples

Can the present analysis help us understand real-world episodes of inter-regional tensions and anticipate such tensions in the future? Here, I offer a few specific examples which, I believe, can be better understood in the light of this model.

### 4.1 Czechoslovakia

The disintegrations of Czechoslovakia, at first glance, seems to defy economic logic. Slovakia, which initiated the break-up, was and poorer: income per person in Slovakia was approximately three-quarters of the Czech level in 1990<sup>12</sup>. In fact, Slovakia appears to have benefited from being part of Czechoslovakia, especially during the post-WWII period when the communist government actively promoted its industrialization. This helped drive convergence in incomes between the two regions: Slovak income per person increased from 64 percent of the Czech level in 1950 to 88 percent in 1989 (Figure 1).<sup>13</sup> Moreover, the disposable NMP was even higher, suggesting that Slovakia benefited from a positive net fiscal transfers.<sup>14</sup>

From the point of view of the analysis in this paper, two facts are important: First, Slovakia was smaller: 5.3 million compared with 10.3 million in the Czech Republic. Second, it was hit more severely by the economic reform that started in 1991, following the end of communist rule. The reform ended central planning,

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<sup>12</sup>The Czech and Slovak 1990 GDP per capita figures were \$16,320 and \$12,750, respectively (in constant 2000 international dollars as reported by the World Development Indicators).

<sup>13</sup>Most communist nations did not report national accounts in the same structure as Western countries and therefore figures on GDP are not available. NMP does not include most some services and depreciation.

<sup>14</sup>Some of this difference, however, can also be attributed to the fact that output of Slovak subsidiaries of companies headquartered in the Czech Republic could be counted as part of Czech NMP

liberalized prices, privatized productive assets (which were almost exclusively in state ownership), and ended preferential trade with the former Eastern Block (Fidrmuc, Horvath and Fidrmuc, 1998). The cost of reform was much greater for the Slovak economy than for the Czech one. Real per-capita GDP fell by 12 percent in the Czech Republic compared to over 20 percent in Slovakia in 1991-92. Czech unemployment, similarly, remained low, at 2.6 percent in 1992, just before the break up, while the Slovak figure was 11.8 percent. This asymmetric effect of the reform was largely due to the greater dependence of Slovakia on trade with the former Eastern Block: large parts of the Slovak industrial sector were built during the communist period and as such they were geared towards trade with other communist countries. The reform thus constituted a negative and persistent shock, which affected Slovakia more severely and more persistently than the Czech Republic.<sup>15</sup>

If the two regions were of similar size, the more adverse realization of the reform-induced shock in Slovakia should have given an incentive to the Czech Republic to push for a break-up, especially since it was also richer. This incentive was moderated, however, by its larger size: it had much more sway over policy making than Slovakia. It was, therefore, the poorer country that pushed for the break up. As I argued above, the poorer region may prefer secession if income inequality in the union is high enough.

Independence brought about two important advantages for Slovakia from the point of view of the present analysis. First, it allowed it to slow down the reform and thus to reduce or postpone its adverse effects. After independence, the new government indeed decelerated the pace of privatization and pursued a more interventionist policy than the previous federal government. The new Slovak currency was devalued almost immediately after the break up, giving the Slovak industry a slight competitive advantage. Second, it allowed the new country to increase the extent of redistribution: newly independent Slovakia adopted higher taxes than the Czech Republic in the period immediately following their break-up.

The disintegrations of the Soviet Union and Yugoslavia were accompanied by much greater expressions of ethnic nationalism, but economic motives appear to have played a their role. Unlike with Czechoslovakia, the initial impetus came from the relatively well-off countries: the Baltic states in the USSR and Slovenia and Croatia in Yugoslavia. With both Yugoslavia and the Soviet Union descending into severe crises at the time of disintegration, the seceding countries had much to gain by severing fiscal ties with the poorer regions (interestingly, this logic seems to have been taken on board by Catalonia during the present recession too). The fact that the three Baltic states, Slovenia and Croatia are at present all relatively well off and member countries of the EU seems to confirm this (although the short-term cost of secession turned out to be very high in the Croatian case).

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<sup>15</sup>Slovak unemployment continued to rise steadily even after the break-up until it peaked at 19.2 percent in 1999. Czech unemployment remained in single digits, peaking at 8.8 percent in 2000

## 4.2 Belgium

Belgium is a country incorporating two languages, Dutch and French, and three regions, Flanders, Wallonia and Brussels.<sup>16</sup> Historically, since its secession from the Netherlands in the 1830s, the political and economic elite was French-speaking and French was also the language of government. Economically, Wallonia used to have the upper hand too since the Industrial Revolution, with the economy dominated by mining and heavy engineering industries concentrated in an industrial belt stretching from Mons through Charleroi to Liège. The Flemish economy, in contrast, was traditionally dominated by textile and agriculture. Both of these sectors went into decline in the second half of the 19th century, unable to compete with the cheaper imports of English machine-produced textile and New World grain, respectively (Buyst, 2009). That pattern remained in place until middle of the 20th century. The turnaround came during the 1950s with the decline and eventual closure of coal mines and the associated metal industries as oil replaced coal as the primary source of energy. The need to import oil (as opposed to using locally available coal) also encouraged the relocation of industrial activity to the Northern Flemish provinces where the port of Antwerp is located. The two oil price shocks further undermined the viability of the heavy industry in Wallonia. In the meantime, the service sector developed in the two largest cities of Brussels and Antwerp. In the case of Brussels, the decision to locate the bulk of EU institutions and bureaucracy in this city also contributed to its growth.

The diverging fortunes of the regional economies in Belgium reflect asymmetric and highly persistent shocks: the economy of Wallonia tanked while those of Flanders and Brussels charged ahead. There is, furthermore, little evidence that the gains from the economic growth in Flanders and Brussels spill over to Wallonia. According to Eurostat figures, Flanders GDP per capita increased from 98 percent of the aggregate Belgian figure in 1996 to 101 percent in 2007 (the latter year is chosen to eliminate the effect of the current recession, if any). During the same 12-year period, Walloon output per person fell slightly, from 73 to 72 percent of the Belgian level. Comparing Wallonia and Flanders directly (to eliminate the effect of Brussels), Walloon GDP per capita fell from 75 percent of the Flemish value in 1995 to 71 percent in 2007. Strikingly, despite large differences in economic conditions, there is little labor mobility across the linguistic border in Belgium (see Bartz and Fuchs-Schündeln, 2012).

In line with the model's prediction, the political opinion in the better-off region, Flanders, has been increasingly in favor of greater fiscal autonomy or outright independence. Between 1970 and present, Belgium undertook several reforms that served to increase the autonomy of the regions and linguistic communities, including their fiscal autonomy.<sup>17</sup> The tensions culminated in 2010-11 when the country was un-

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<sup>16</sup>In addition, there is also a small German-speaking region in Eastern Belgium.

<sup>17</sup>A concise history of constitutional reform in Belgium is at [http://en.wikipedia.org/wiki/State\\_reform\\_in\\_Belgium](http://en.wikipedia.org/wiki/State_reform_in_Belgium).

able to form a new government for a total of 541 days. Given the lack of labor mobility, increasing monolingualism of both Flanders and Wallonia and falling fiscal redistribution, the two regions are likely to continue to diverge also in the future.

Belgium is frequently likened to Italy: both countries have a dynamic and prosperous Northern region while the South is sluggish and poor. Yet, Italy has a single national language and labor mobility between the North and South, while not particularly high, does take place. Even more importantly, despite its lackluster reputation, the South is in fact catching up (albeit slowly) with the North: its income per head rose from 65 percent of the Italian level in 1996 to 67 percent in 2007.<sup>18</sup> During the same period, relative income per head fell in North-West and North-East, from 125 and 124 percent of the Italian figure, to 122 and 120 percent, respectively.

## 5 Conclusions

The recent experience of the eurozone demonstrates very clearly that a currency union that is not complemented by an effective fiscal transfer mechanism can easily run into difficulties. The importance of fiscal redistribution was accepted early on in the context of the OCA theory (McKinnon, 1963). Subsequently, a number of studies (Beetsma and Jensen, 2005; Galí and Monacelli, 2008; Farhi and Werning, 2013; and others), developed this argument formally. They show that, from the point of view of ex-ante welfare maximization, it is optimal to complement currency unions with fiscal ones: this helps stabilize incomes and consumption over time and reduces divergence of policy preferences.

This paper argues that what is optimal ex ante does not necessarily remain optimal also ex post. In particular, the nature of shocks is paramount. For fiscal unions to be politically stable, two aspects of shocks play a role: their correlation (symmetry) and their persistence. The former mirrors the OCA arguments about the need for symmetric shocks: when participating countries experience similar shocks, neither has much incentive to quit (regardless of whether the shocks are temporary or persistent). Things become more complicated when shocks are negatively correlated (or uncorrelated). The benefits of risk-sharing can be indeed substantial in this case, but only when shocks are temporary. With permanent shocks, a sufficiently large one can turn risk sharing into a long-term unidirectional transfer. Europe abounds with examples. Fiscal transfers between Flanders and Wallonia (both regions of Belgium), West and East Germany, or eurozone core and periphery are all going to be in one direction for years to come.<sup>19</sup> These transfers constitute redistribution in the wake

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<sup>18</sup>These figures compare GDP per capita of the Italian Sud region (comprising Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Isole, Sicilia, and Sardegna) with that of Italy as a whole. Comparing Sud, the poorest region, with Nord Ovest (Piemonte, Valle d'Aosta, Liguria and Lombardia), the richest, yields similar result, with the ratio being 52 and 55 percent in 1996 and 2007, respectively.

<sup>19</sup>Unless, of course, the fortunes are reversed and Flanders, West Germany or the eurozone core

of past large and highly persistent shocks, not insurance against future ones. The reluctance with which such transfers are made, and the conditions, limitations and safeguards attached to them, underscore the importance of political-economy aspects of integration.

The preceding argument about persistent shocks goes against the conclusion of Farhi and Werning, who find the benefits from fiscal unions to be especially significant for persistent shocks. This again reflects the difference between what is optimal *ex ante* and *ex post*. An instructive analogy is a lottery pool. Consider two (risk averse) persons who buy one lottery ticket each and agree to share any winnings. *Ex ante*, both have an incentive to enter such an arrangement. *Ex post*, if one wins a small prize, the benefits of continuing the pool may outweigh the potential gain from reneging. If the prize is sufficiently large, however, the person in possession of the winning ticket has a very strong incentive to renege on the agreement. Participants in lottery pools can take each other to court if they disagree about the distribution of the proceeds. All that a dissenting member of a fiscal union needs to do to implement the exit option is abrogate the treaty or constitution binding them or secede unilaterally.

Importantly, fiscal unions may be politically unpopular also in the countries on the receiving end of fiscal transfers. The protests in Greece and Spain against austerity measures imposed from Brussels and Frankfurt demonstrate this; the break up of Czechoslovakia, instigated by Slovakia, the poorer partner in the federation, is another example. Quitting the fiscal union allows the rich member country to lower taxes and reduce the extent of redistribution, while it leads to the opposite in the poor member. In either case, the result is fiscal policy that is closer to the preferences of the median voter.

Last but not least, measures shaping the transmission of shocks can play a crucial role in determining the stability of fiscal unions. The devolution in the UK and greater fiscal autonomy of regions in Spain and Belgium (including fostering the greater use of regional languages in the latter two) are likely to make these countries more vulnerable in the future. In contrast, Greek membership in the eurozone may have been saved by the financial integration that the introduction of the euro facilitated: a sovereign default of Greece would be very costly for the banking sectors in a number of eurozone countries, including Germany.

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experience an even larger negative shock.

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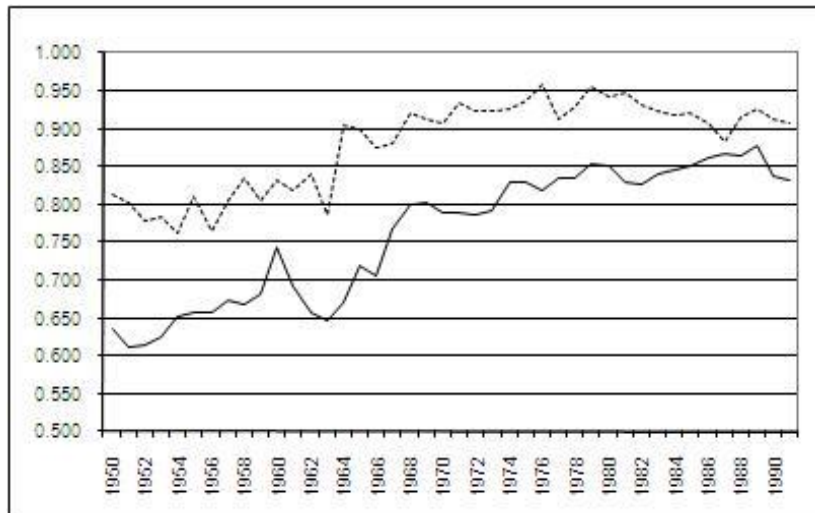


Figure 1 Ratio of Slovak to Czech NMP and Disposable NMP, 1950-1991

Sources: Historical Statistical Yearbook of Czechoslovakia (1985) and Statistical Yearbook (various issues), Federal Statistical Office, Prague.

Note: Solid line depicts NMP while dotted line is disposable NMP